Update on rotavirus disease burden and vaccine effectiveness monitoring

Meeting of the Advisory Committee on Immunization Practices

Daniel C. Payne, PhD, MSPH

CDC, NCIRD, Division of Viral Diseases, Epidemiology Branch

February 22, 2007

New Vaccine Surveillance Network (NVSN)

Prospective, population-based acute gastroenteritis (AGE) surveillance in 3 counties:

- ➢ Vanderbilt University Medical Center
  - Davidson County, TN
- ➢ University of Rochester Medical Center
  - Monroe County, NY
- ➢ Cincinnati Children's Hospital Medical Center
  - Hamilton County, OH

NVSN objectives for AGE/rotavirus surveillance

Establish and support prospective, population-based surveillance to:

- ➢ estimate the annual burden of rotavirus gastroenteritis among children <3 years old
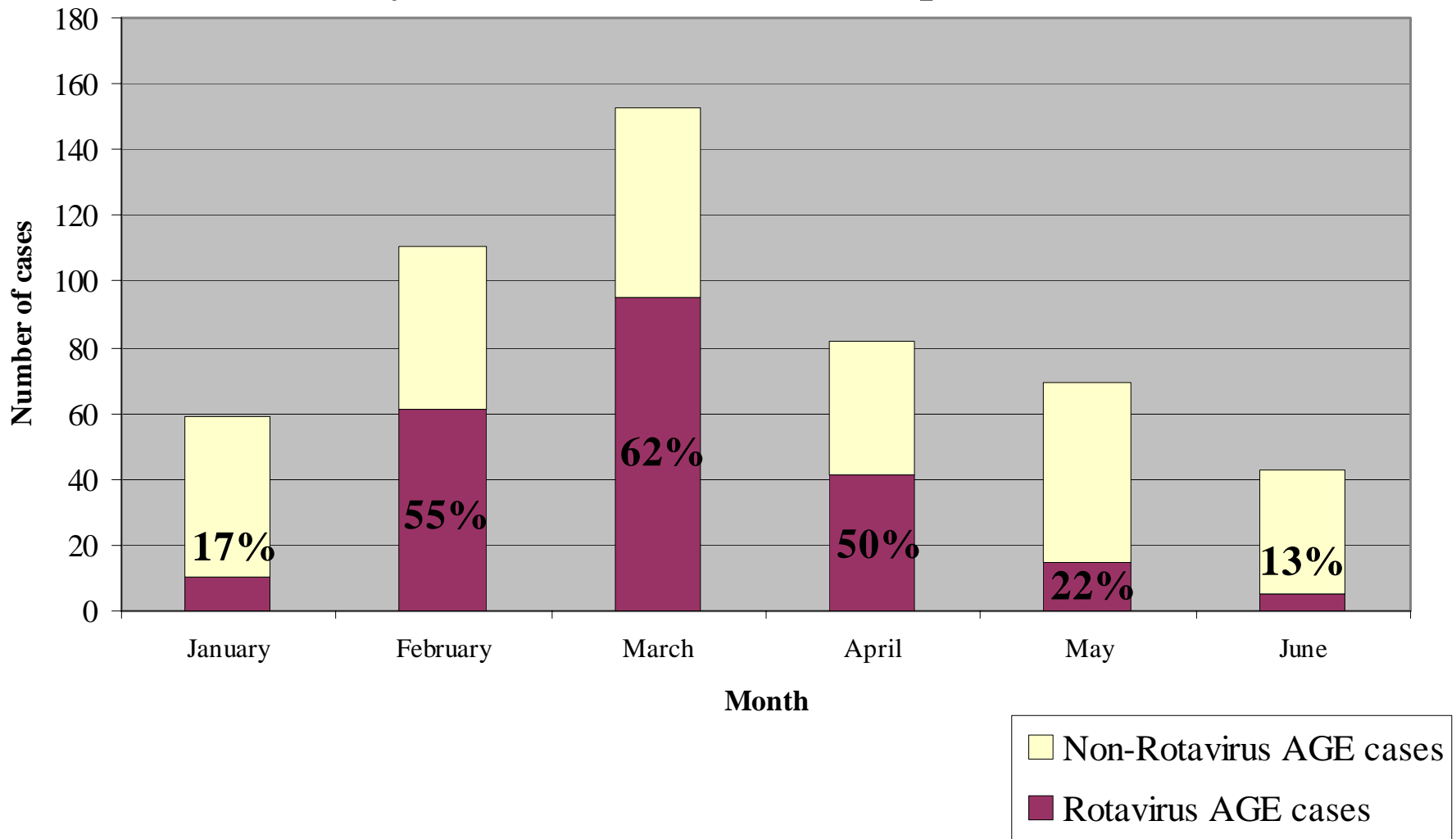- ➢ monitor the effectiveness and impact of rotavirus vaccination

Inaugural year of NVSN AGE/rotavirus surveillance

Presentation of preliminary data for 1st rotavirus surveillance season January 1, 2006 – June 30, 2006

➢ Description of surveillance data
➢ Proportion rotavirus positive by EIA in hospitals, emergency departments and outpatient clinics
➢ Population-based hospitalization rates
➢ Preliminary lab typing data

Number of AGE surveillance cases among < 3 year olds by month (with % rotavirus positive)

Number of cases (y-axis): 0, 20, 40, 60, 80, 100, 120, 140, 160, 180

Month (x-axis): January, February, March, April, May, June

- January: 17%
- February: 55%
- March: 62%
- April: 50%
- May: 22%
- June: 13%

Legend:
- Non-Rotavirus AGE cases
- Rotavirus AGE cases

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Rotavirus positive by surveillance site

44% of all AGE cases <3 years old were rotavirus positive

NVSN Site	Number Enrolled with Specimens (n=517)	Percent Rotavirus Positive (by EIA)
Vanderbilt University Medical Center	175	43%
University of Rochester Medical Center	83	35%
Cincinnati Children's Hospital Medical Center	259	47%

Rotavirus positive by provider type

Health Provider Type	Number Enrolled with Specimens (n=517)	Percent Rotavirus Positive (by EIA)
Hospital	182	50%
Emergency Department	201	50%
Outpatient Clinic	134	27%

NVSN rotavirus burden among children < 3 years old

Numerator: Rotavirus cases adjusted for differential specimen collection, non-enrollment, and weekly # of surveillance days by surveillance site

Denominator: 2000 census data for surveillance counties

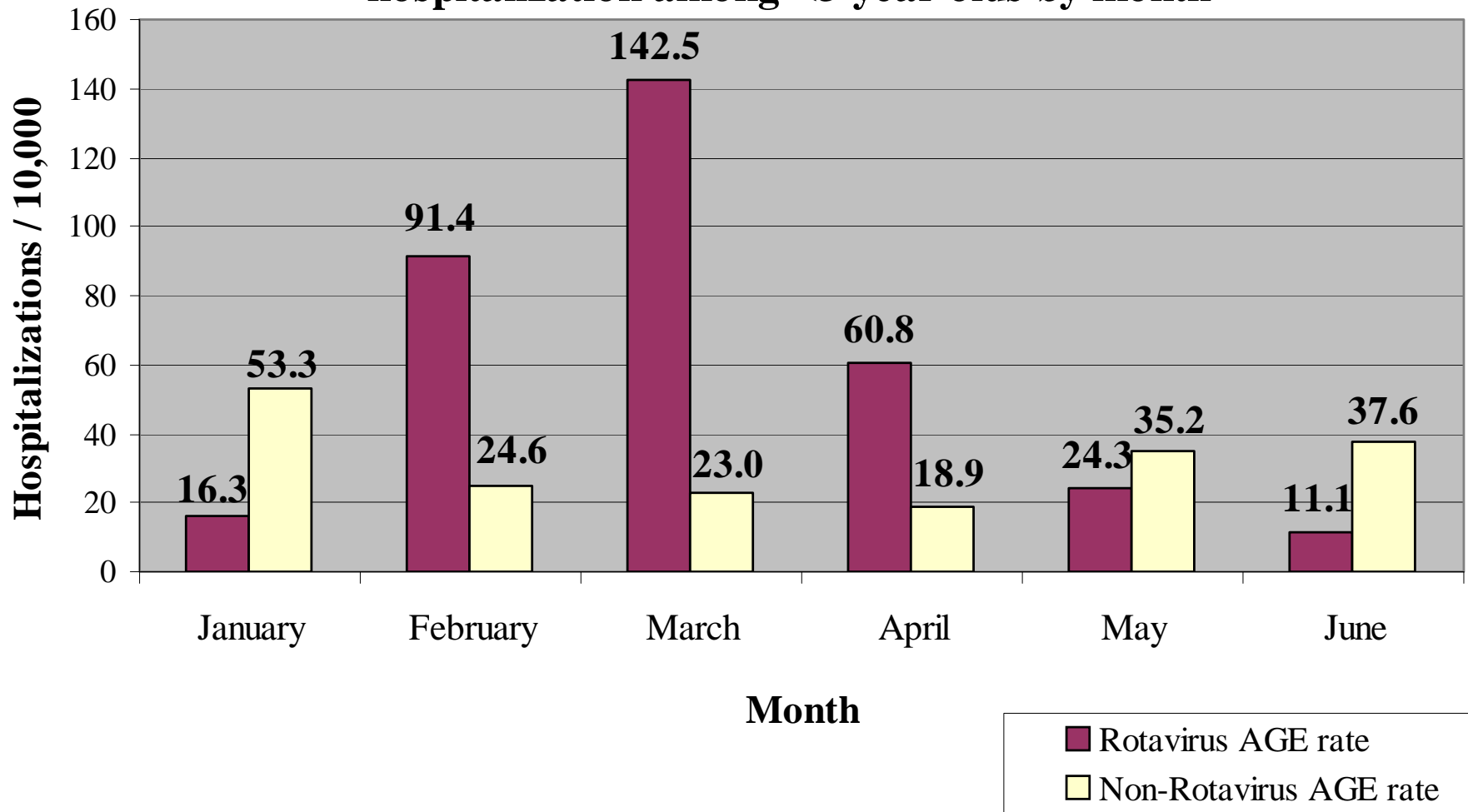# NVSN rotavirus hospitalization rates for children <3 years old

Site	Rotavirus Hospitalization Rate per 10,000
Vanderbilt	29.4
Rochester	13.5
Cincinnati	41.0
TOTAL	**28.9**

* Indirect NHDS Rotavirus hospitalization rate for <5 yr olds = 27.4 / 10,000

Parashar UD, Holman RC, Clarke MJ, Bresee JS, Glass RI. Hospitalizations associated with rotavirus diarrhea in the United States, 1993-1995: Surveillance based on the new ICD-9-CM rotavirus-specific diagnostic code. *J Infect Dis* 1998; 177: 13-17.
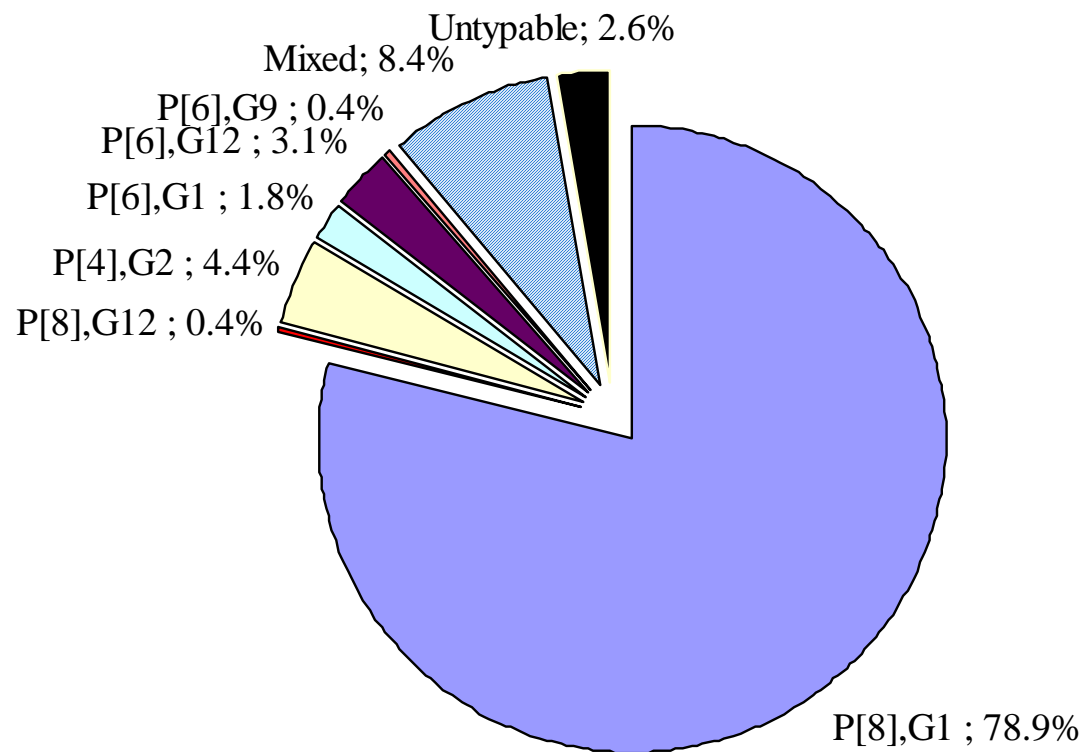
CDC

Rates of Rotavirus AGE and Non-rotavirus AGE hospitalization among <3 year olds by month

Bar chart showing hospitalizations per 10,000 (y-axis) by month (x-axis).

Month	Rotavirus AGE rate	Non-Rotavirus AGE rate
January	16.3	53.3
February	91.4	24.6
March	142.5	23.0
April	60.8	18.9
May	24.3	35.2
June	11.1	37.6

Y-axis: Hospitalizations / 10,000

X-axis: Month

Legend:
- ■ Rotavirus AGE rate
- □ Non-Rotavirus AGE rate

Rotavirus Strain Types
NVSN 2006

Untypable; 2.6%

Mixed; 8.4%

P[6],G9 ; 0.4%

P[6],G12 ; 3.1%

P[6],G1 ; 1.8%

P[4],G2 ; 4.4%

P[8],G12 ; 0.4%

P[8],G1 ; 78.9%

NVSN rotavirus vaccine effectiveness studies

Objective: To determine rotavirus vaccine effectiveness in the 3 NVSN communities

Time Period: 2006-2007 & 2007-2008 rotavirus seasons

Methods: Uses lab-confirmed cases obtained from active, population-based surveillance and compares their vaccination status with a.) a community cohort and b.) other NVSN surveillance controls

Limitations

1. Untypables and mixed strain specimens are being further analyzed by CDC

2. One year of surveillance data places limits on our conclusions (small n) – further years of surveillance are needed to verify trends

Conclusions

1. Rates of rotavirus hospitalizations are consistent with published estimates, but 2005-2006 appears to have been a mild rotavirus season in Rochester, NY area

2. Half of AGE hospital and emergency department visits were for rotavirus during surveillance season – consistent across NVSN surveillance sites; higher than some published estimates

3. Approximately 96% of strains we detected had matching antigens covered by the current rotavirus vaccine

4. Results show the strength of NVSN platform to monitor trends in rotavirus burden, strain prevalence, and vaccine effectiveness in upcoming years

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Acknowledgements

- **Cincinnati Children's Hospital Medical Center:** Mary Staat, Gerry Fairbrother, Michol Holloway, and other CCHMC surveillance staff

- **Vanderbilt University Medical Center:** Kathryn Edwards, Marie Griffin, Diane Kent, and other Vanderbilt University surveillance staff

- **University of Rochester Medical Center:** Peter Szilagyi, Caroline Hall, Geoff Weinberg, Gerry Lofthus, and other University of Rochester surveillance staff

- **Centers for Disease Control and Prevention:** Jim Alexander, Umesh Parashar, Jon Gentsch, Marika Iwane, Aaron Curns, Lauren Stockman, and other CDC staff